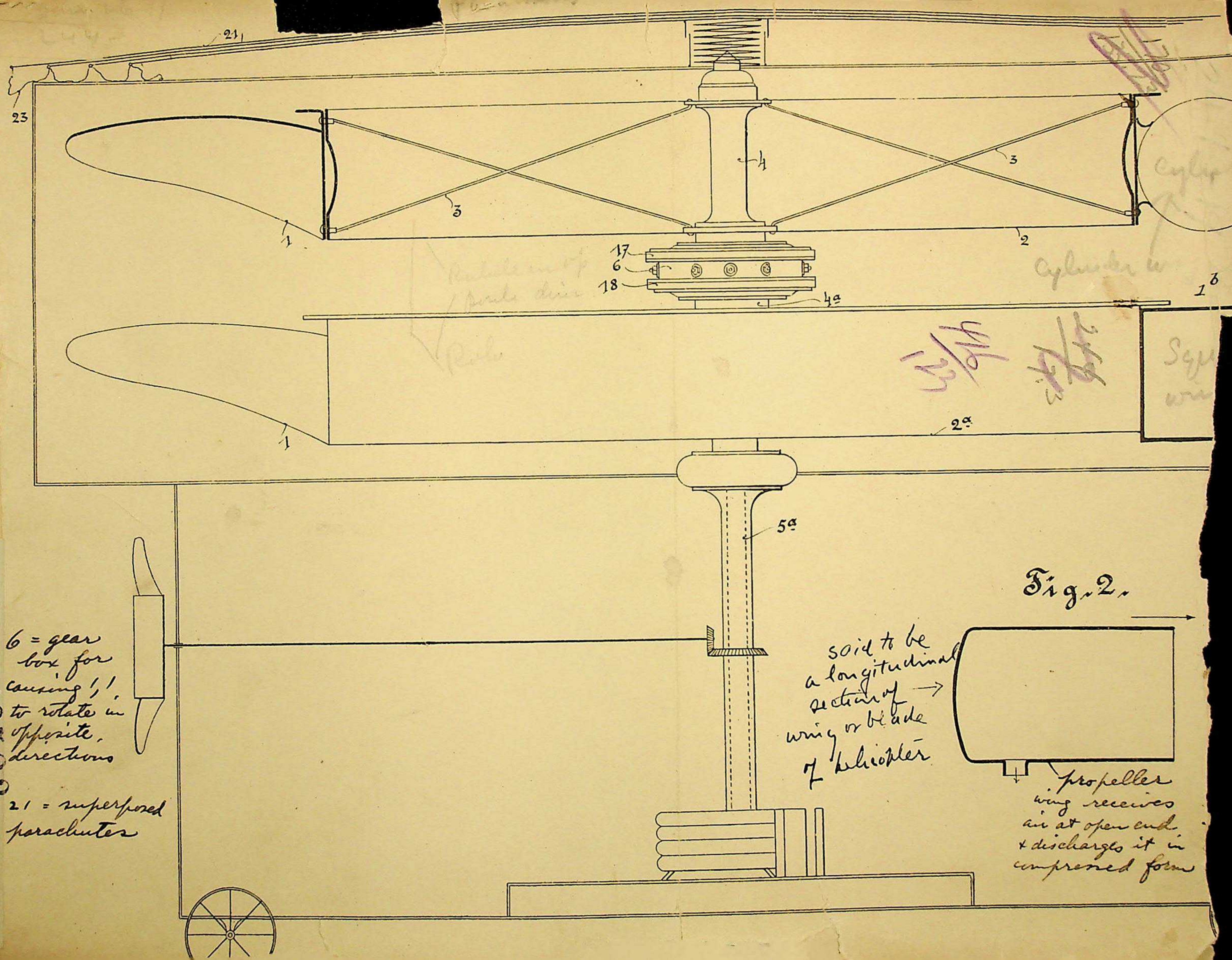
170-13523



6 = gear box for causing 1, 1, to rotate in opposite directions

21 = superposed parachutes

Fig. 2.

said to be a longitudinal section of wing or blade of helicopter

propeller wing receives air at open end & discharges it in compressed form

416/128
~~170 135.28~~

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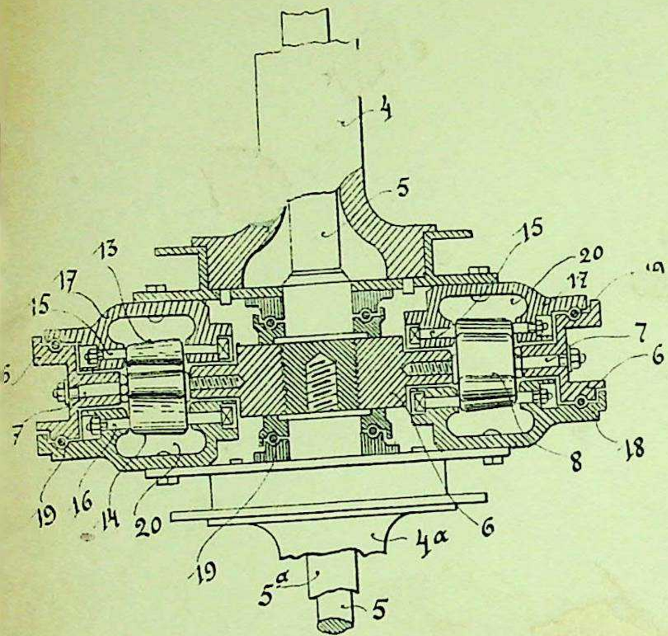
Fig. 3.



.4.

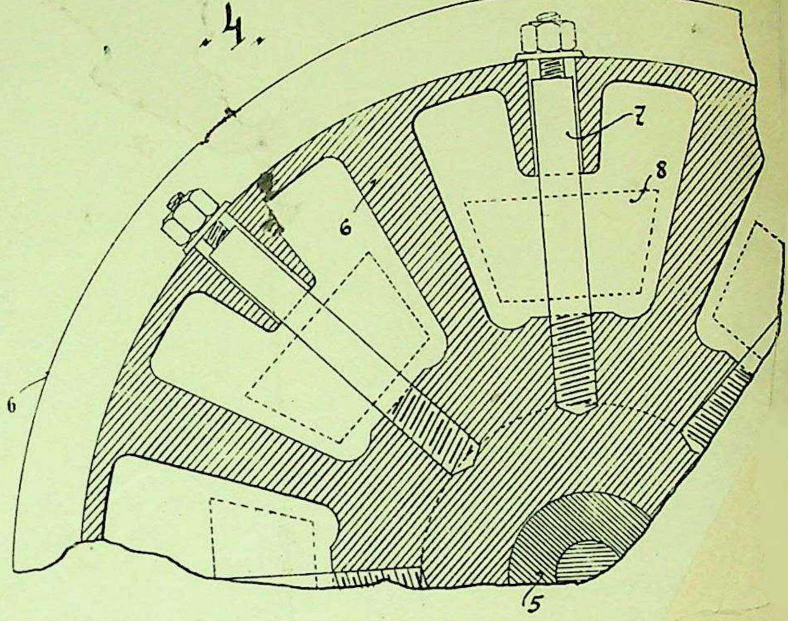


Fig. 6.

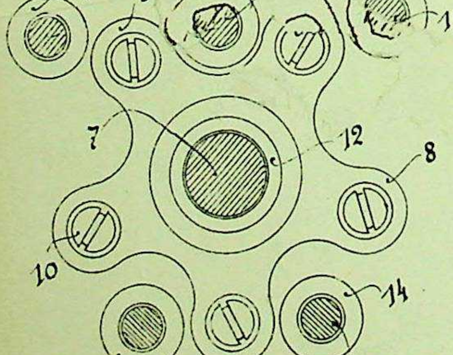


Fig. 10.

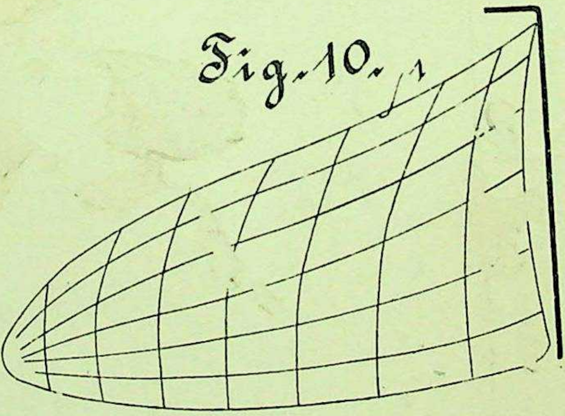


Fig. 7.

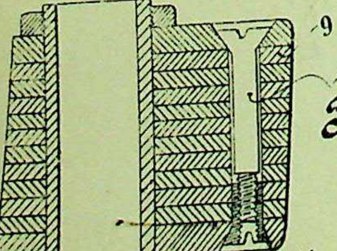


Fig. 11.

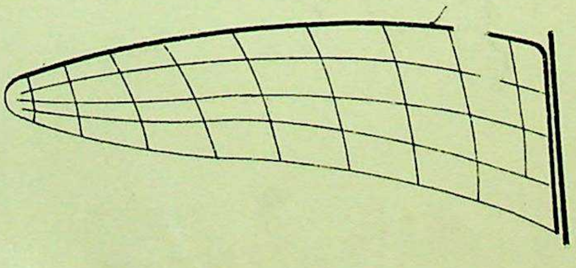


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Fig. 5.

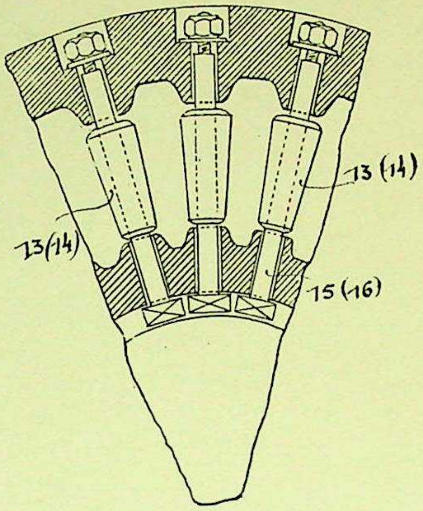


Fig. 8.

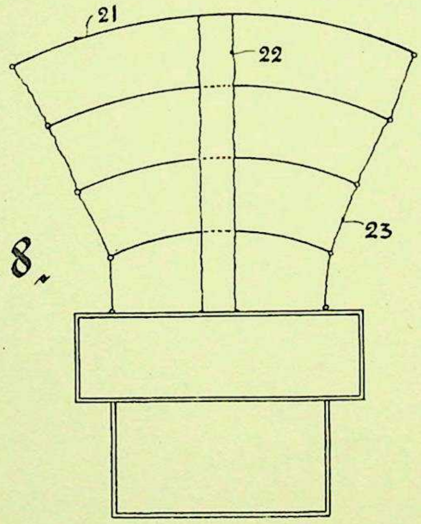
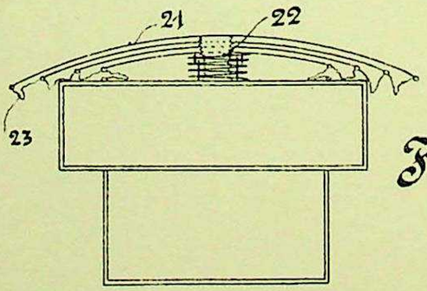


Fig. 9.



Malby & Sons, Photo-Litho.

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N° 3305 A.D. 1910

Date of Application, 10th Feb., 1910—Accepted, 26th Jan., 1911

COMPLETE SPECIFICATION. Duplicate

A New or Improved Flying Machine.

We, Wasily Lewitsky, of Stawropol (Caucasus), Major General, and Paul Lyssow, of Rostow on the Don, Engineer, both in the Empire of Russia, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement and accompanying drawings:—

This invention relates to a flying machine that is characterised by the provision of a twin propelling device comprising two separate propellers of novel construction adapted to rotate in opposite directions and which is also characterised by the provision of a parachute for use during the descent of the machine. The propelling wings are constructed each as a vessel of cylindrical, cubical, or other suitable form, wherein the front, that is to say, the side turned towards the direction of flight, is left open, whilst an aperture is provided either in the side or in the bottom of the vessel. When the propeller rotates at a sufficiently high speed the hollow wings protrude into the air, which is thereby forced into them, the compressed air exerting pressure upon the walls of the wings; a difference of pressure will however be produced on account of the air flowing through the aperture in the side or bottom of the wing already referred to, and in consequence of this difference of pressure there is exerted upon the upper wall of the wing a force which tends to lift the wings and therefore also to lift the shaft, together with the whole apparatus. The resultant force of these components constitutes the lifting force of the machine. The cross-sectional area of the outlet aperture, or, if there is more than one, the sum of the cross-sectional areas of these apertures must be less than the cross-sectional area of the inlet aperture, to produce the degree of air-compression requisite when the wings are in motion. Should only one propeller be used, it might occur that the air would present so much resistance to the wings as to cause the machine itself to rotate, but this risk is obviated by the use of two propellers rotating in opposite directions. The upper propeller engaging with the air produces above it a rarefaction thereof and beneath it a compression, with the result that the lower propeller works in compressed air by which means its efficiency is considerably increased whilst at the same time much greater stability is imparted to the machine.

The accompanying drawings illustrate a machine in accordance with this invention, wherein

Figure 1 is a view of the flying machine partially in section and shewing modified forms of the wings;

Figure 2 is a longitudinal section of one of the forms of the wings;

Figure 3 a section through the actuating sleeve;

Figure 4 shows a detail of the fixed disc, and

Figure 5 a detail of the rollers;

Figure 6 is a view of the driving wheel, and

Figure 7 a section through the same;

Figures 8 and 9 illustrate details of the parachute,

Figure 10 is a side view and

Figure 11 a section shewing a modified form of wing.

[*Price 8d.*]

The wings 1 of the propeller, as shown in Figures 1 and 2, are mounted on the rims 2 and 2^a of the propeller wheels. These rims 2 and 2^a are by means of tangential spokes 3 connected with the hubs 4 and 4^a which are rotatable on ball-bearings about the shafts 5 and 5^a. Between the two propellers there is arranged a device (Figures 3, 4, 5, 6 and 7) which enables the propellers to rotate in opposite directions. This device comprises a fixed disc 6, mounted on a shaft 5, which is likewise stationary. This disc 6 is provided with recesses (Figure 4) wherein there are arranged on radial shafts 7, driving wheels 8, each consisting of a number of plates 9, connected together by means of bolts 10 and nuts 11, and furnished with bronze bearings 12. This arrangement obviates the risk of the teeth being broken, an accident which frequently occurs in the case of spur-wheels cast in a single piece. The wheels 8 (Figure 6) project between the rollers 13 and 14 which rotate about the shafts 15 and 16 fixed in the recesses of the discs 17 and 18. The rollers 13 and 14 are of conical form and extend in a radial direction; there are about 25 of them to about 8 driving wheels. Both of the movable discs 17 and 18 are attached by means of bolts to the flanges of the hubs 4 and 4^a and run on the stationary disc 6 on ball-bearings 19. To protect the driving mechanism from rapid deterioration through wear it is advisable that the interior space 20 of the discs should be filled with oil.

Motion is transmitted to the hub 4^a, and thence to the disc 18 and to the lower propeller, directly from the motor by means of the hollow shaft 5^a, the rollers 14 causing the driving wheels 8 in the stationary disc 6 to rotate, and by means of the same wheels and of the rollers 15 of the other movable disc 17 and of the sleeve 4, the rotating movement is transmitted to the upper propeller, the two propellers being thus caused to rotate in opposite directions.

A propeller constructed as above described may be provided with a number of wings, instead of the two wings heretofore usual. For example there may be as many as five. The twin propeller already described is intended to effect the lifting of the apparatus, whilst the forward movement of the machine is effected by means of a single propeller mounted on a horizontal shaft.

To ensure that the machine shall be able to descend safely and steadily in case of an unfortunate interruption of its working there is provided a compound parachute device consisting of a number of separate parachutes 21. When the machine rises these parachutes are caused by the pressure of the air to lie closely against the machine; as soon, however, as the machine begins to descend they open and thus provide protection against too sudden descent. The parts 21 are provided with an elastic tube 22 by means of which the centres of all the different parachutes are connected so as to protect them from being bulged outwards. The rims of the parachutes are connected with each other and with the machine by means of bands or cords 23. Figures 10 and 11 illustrate the form of wings shown to the left of Figure 1. These wings are helicoidal and taper towards their tips; their construction being such that the resultant of the forces acting on the wing is near to the inner edge or on the base of the wing, which enables the weight of the wings to be considerably reduced. Wings of the kind shewn in Figures 10 and 11, moreover, in consequence of their attachment to the disc can exert pressure on the air throughout their whole area, whilst in the case of ordinary propellers, the area close to the hubs does not participate in the working of the wing.

The wings may be cylindrical as shown at 1^a or they may be square as shown at 1^b.

It will be seen from the foregoing description that our invention consists essentially in the novel construction and arrangement of the twin propellers by which the machine is lifted, whilst provision for a steady descent is made by the novel arrangement of the parachute and we do not claim *per se* twin propellers for raising airships, or parachutes for their descent.

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:—

1. A flying machine characterised by the fact that the lifting of the machine is effected by means of a twin-propeller of special construction, the two parts of which are attached to a vertical motor shaft and are rotated in opposite directions in a horizontal plane one above the other by means of a sleeve, whilst the descent of the machine, when the motor is stopped, is effected in a steady and secure manner by means of a compound parachute device.

2. A twin-propeller in accordance with the preceding claim characterised by the fact that there are provided wings 1 which are attached to the rims 2 of wheels which rotate on the hubs 4 and 4ª about a stationary shaft and which have the form of a vessel open in front and provided in the rear part of its bottom or side with an aperture for the escape of the compressed air.

3. In the flying machine in accordance with the first preceding claim, wings each formed as a vessel characterised by the fact that the cross-sectional area of the outlet aperture or the sum of the cross-sectional areas of the outlet apertures, if there are more than one, is less than the cross-sectional area of the inlet aperture for the purpose of producing the compression of the air requisite to bring about the motion of the wings.

4. A sleeve for producing rotation in opposite directions in accordance with the first preceding claim characterised by the provision of a stationary disc 6 mounted on a vertical shaft 5 between two movable discs 17 and 18 which are provided with conical rollers 13 and 14 extending in a radial direction and mounted in shafts 15 and 16, the arrangement being such that during the rotation of the disc 18 the lower rollers 14 by means of the driving wheels 8 and of the upper rollers 13 cause the upper disc 17 to rotate and that the movable discs run upon the stationary one on ball bearings 19.

5. A parachute device in accordance with the first preceding claim characterised by the provision of a number of separate parachutes 21 which are connected with each other by means of an elastic tube 22 for the purpose of preventing the bulging out of the parachutes.

Dated the 8th day of February, 1910.

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Chartered Patent Agents,
Chancery Lane Station Chambers, London,
Agents for the Applicants.

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